

## A REVISION OF SOME SPECIES OF *RONCUS* L. KOCH (NEOBISIIDAE, PSEUDOSCORPIONES) FROM NORTH AMERICA AND SOUTH EUROPE

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**ABSTRACT.** The available material of the species *Roncus lubricus* L. Koch, 1873, from North America and South Europe has been studied. It was concluded that specimens of *R. lubricus* from the United States belong to the nominal subspecies. Furthermore, it is assumed that the USA populations of this subspecies were probably introduced by human activity. A new subspecies, *R. lubricus pannonicus*, from Yugoslavia is described. A key to the subspecies of *R. lubricus* is presented.

An analysis of the available type material from the collection of J. Hadži has supported the elevation of two of his subspecies to full specific rank: *Roncus tenuis* Hadži, 1933, new status, and *R. dalmatinus* Hadži, 1933, new status, both from northern Dalmatia, Yugoslavia. These two species were formerly regarded as subspecies of *R. lubricus*, but this study revealed that they are not members of the *R. lubricus* group (since they both lack microsetae proximal to *eb* and *esb*). Both species are considered endemics to the Balkan Peninsula. Most diagnostic characters of the analyzed taxa are thoroughly described or figured. Some taxonomic interrelationships and features of geographic distribution have been also briefly discussed.

The genus *Roncus* was established in 1873 by L. Koch for three new species. The first included species, *R. lubricus*, was subsequently designated as the type species (Beier 1932). The systematics of the genus is very poorly known. Setation and morphometric characters are usually employed, but they may be useful to distinguish between endemic or cave-inhabiting species. A relative "homogeneity" of these characters in most epigean species does not permit their use for taxonomic purposes (Gardini 1981, 1983). The so-called "*R. lubricus*" in fact represents a heterogeneous group of taxa widely distributed in western Europe and the northern Mediterranean region. Therefore, a thorough analysis of different members of this group seems necessary in order to establish sound criteria for delimiting the taxonomic status of different populations of "*R. lubricus*". Of the two existing type specimens of each sex, Gardini (1983) designated and redescribed the male of *R. lubricus* from Bloxworth, United Kingdom, as the lectotype. Both specimens are deposited in the collection of Rev. O. Pickard-Cambridge in the University Museum at Oxford. A full account of the external morphology of *R. lubricus* from near Henley-on-Thames, UK, was presented by Gabbott & Vachon (1967). Muchmore (1969) collected a number of *R. lubricus* specimens from Rochester,

N.Y., USA. In 1981, one of us (BPMC) also obtained a sample of the same species from the USA, but from Cambridge, Massachusetts. Additionally, we collected a number of specimens of *R. lubricus* or of populations that were considered as closely related to this species (Ćurčić 1982, 1991; Poinar & Ćurčić, 1992), from Mt. Avala and the village of Obrež, both near Belgrade, Yugoslavia (southeastern Europe). In addition, we analyzed four of the type specimens of *Roncus lubricus tenuis* Hadži, 1933, and *R. lubricus dalmatinus* Hadži, 1933, (two of each subspecies) in order to verify their taxonomic status. Both "subspecies" inhabit the northern Mediterranean region.

The aim of this study was to verify precisely the taxonomic position (status) of some North American and South European representatives assigned to *R. lubricus*, including those of the type series of Hadži's two subspecies; to contribute to the knowledge of variation between and among different populations of *R. lubricus*; and to analyze their geographical distribution in North America and South Europe.

### METHODS

The samples from Rochester, Cambridge (USA), and Obrež (Yugoslavia) were collected by hand, by sifting leaf-litter and humus, or by

Tullgren extractions from leaf litter and soil. After collecting, all specimens were preserved in 70% alcohol with 5% glycerine added. The accessible type specimens of *R. lubricus tenuis* and *R. lubricus dalmatinus* from Hadži's collection (now in our possession) have been subjected to redescription and further analysis. Measurements (Tables 1–3) have been made in accordance with Chamberlin (1931) and Čurčić (1982, 1988), and the drawings in accordance with Čurčić (1982, 1988).

#### NEOBISHIIDAE CHAMBERLIN, 1930

##### *Roncus lubricus lubricus* L. Koch, 1873 (Figs. 1–15; Table 1)

**Specimens examined.**—USA: Massachusetts: Cambridge, 4 males, 8 females, and 1 tritonymph (collected from leaf litter and humus on the grounds of the American Academy of Arts and Sciences), 18 July 1981 (B. P. M. Čurčić and P. S. Petrović); New York: Monroe Co., Rochester, 8 males and 6 females, (collected from leaf litter and soil along base of wall shaded by sycamore tree), 24 September 1967 (W. B. Muchmore).

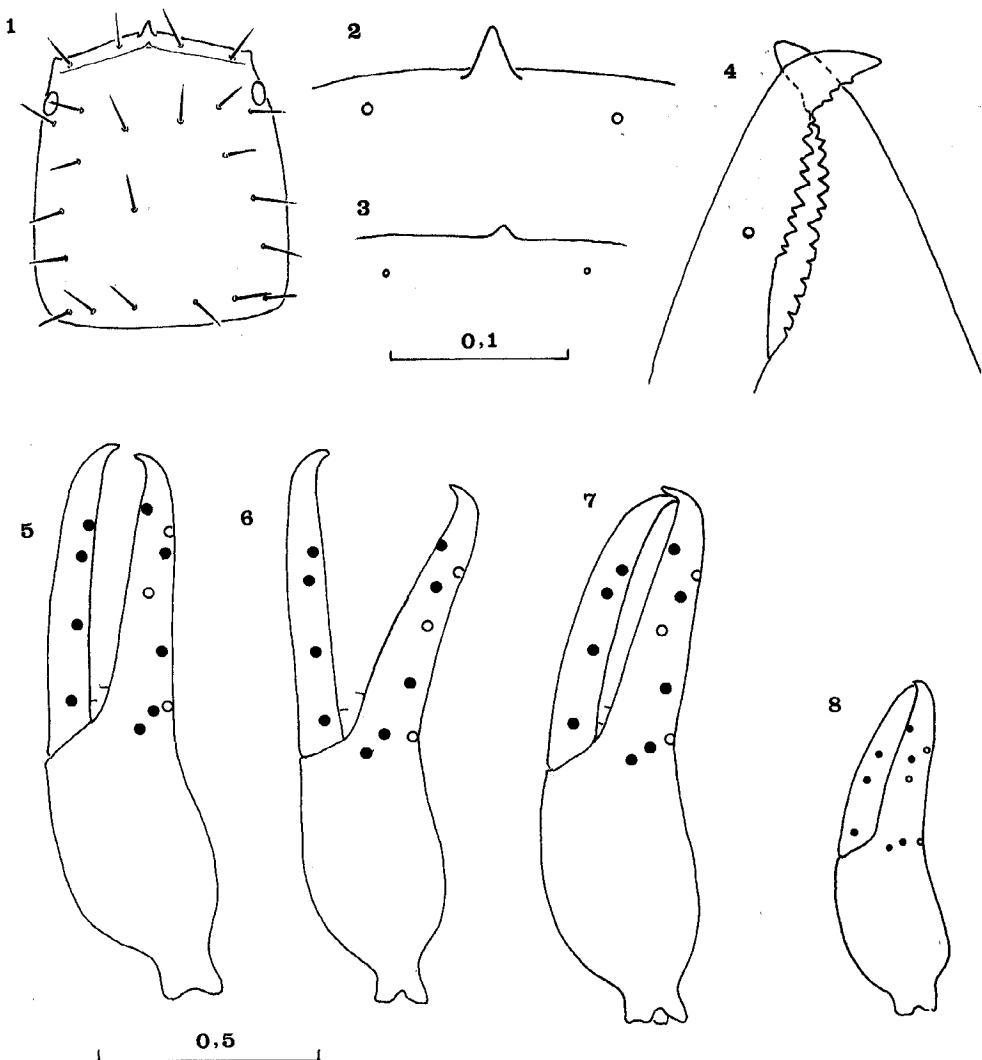
**Description.**—Carapace somewhat longer than broad (Fig. 1; Table 1). Epistome triangular and pointed or apically blunt (Figs. 2, 3). Eyes well developed. Anterior row with 4, ocular with 5–7, median and intermedian rows each with 6–8, and posterior row with 6 (rarely 5) setae.

Tergite I with 6 or 7 setae, tergite II with 8–11 setae, and tergites III–X each with 9–13 setae. Male genital area: sternite II with a cluster of 14–19 setae; of these, 8–10 longer setae on the posterior sternal margin and the remainder in the median and posterior region, thinning out anteriorly. Sternite III with 5–7 anterior and median setae, 9–11 posterior setae, and 3 suprastigmal microsetae on each side. Female genital area: sternite II with a cluster of 9–15 setae in form of an irregular triangle or circle; sternite III with a transverse row of 11–15 posterior setae, and 3 small setae along each stigma. Tritonymph: sternite II with 2 setae only, sternite III with 9 setae, and 2 or 3 microsetae along each stigma. On sternite IV, three microsetae along each stigmatic plate in both adults and tritonymph. Sternite IV with 7 (tritonymph) or 10–15 setae (adult); sternites V–X each with 11–15 setae. From sternite VII onwards, 2 median setae slightly anterior to the row of marginal setae. Cheliceral spinneret (galea) as a low hyaline convexity (Fig. 4), slightly less prominent in males than in females or tritonymph. Cheliceral palm

with 6 setae in both sexes and tritonymph, movable finger with one seta. Fixed cheliceral finger with 15–17 small teeth diminishing in size both distally and proximally. Movable cheliceral finger with 10–13 teeth (Fig. 4). Flagellum with 1 short proximal blade and 7 longer blades distally. Apex of pedipalpal coxa with 4 long, acuminate setae. Pedipalpal trochanter with two small lateral tubercles and with inconspicuous granulations dorsally; femur with a single lateral tubercle, granulation as in Figs. 12, 13, 15. Tibia smooth. Chelal palm with some inconspicuous granulations (Figs. 12, 13, 15); a group of 1 to 4 microsetae proximal to trichobothria *eb* and *esb* (Figs. 9–11); a single tubercle on laterodistal side. Fixed chelal finger with 57–64 (female), 59–68 (male), and 40 teeth (tritonymph); distal teeth asymmetrical, followed by small, close-set, and retroconical teeth. Movable chelal finger with 57–62 female, 57–68 (male), and 42 teeth (tritonymph); only distal teeth pointed and retroconical, and these becoming rounded or square-cusped teeth which extend as far as the level of *b*. Sensillum between 16th and 22nd (male), between 12th and 20th (female), or at level of 11th tooth (tritonymph). Sensillum in male is either distal to or at level of *sb*; in female, slightly proximal to, distal to, or at the level of *sb*; and in tritonymph, slightly proximal to *st*.

Chelal fingers longer than chelal palm and slightly shorter than or equal to pedipalpal femur (Table 1). Pedipalpal femur length almost equal to carapacial length (Table 1). Trichobothriotaxy: *ist* somewhat closer to *est* than to *isb*; *sb* equidistant from *b* and *st* (Figs. 5–7). Trichobothriotaxy of tritonymph as in Fig. 8. (Trichobothriotaxy almost identical to *R. lubricus* from the UK (Gabbott & Vachon 1967)). Trochanteral foramen pointed and sclerotized. Tibia IV, basitarsus IV, and telotarsus IV each with a long tactile seta (Fig. 14). Tactile seta ratios, morphometric ratios and linear measurements are given in Table 1.

**Distribution.**—It is still impossible to outline the true distribution of *Roncus lubricus* (Gardini 1983). Gardini suggested that in Europe this species may be widespread in the United Kingdom, France, and Belgium. In North America, *R. lubricus* is distributed in the eastern United States. Its presence in New York and Massachusetts supports the assumption that it is a permanent inhabitant of these regions. The findings of subadult stages in the localities analyzed (Muchmore 1969) strongly confirm its ecological adaptability



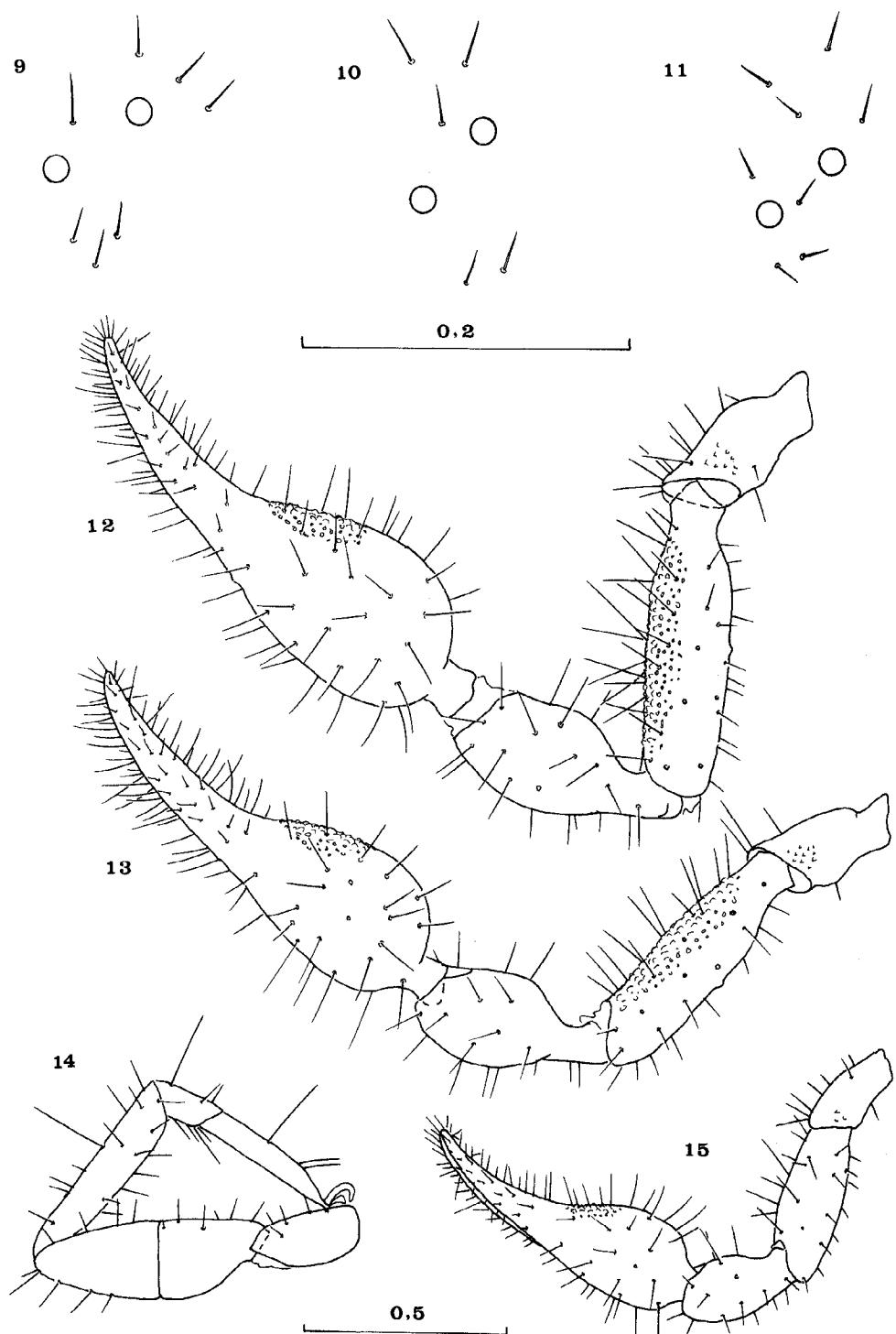
Figures 1–8.—*Roncus lubricus lubricus* L. Koch, 1873, from Cambridge, Mass., USA: 1, carapace, male; 2, epistome, male; 3, epistome, tritonymph; 4, cheliceral fingers, female; 5, pedipalpal chela, male; 6, pedipalpal chela, male; 7, pedipalpal chela, female; 8, pedipalpal chela, tritonymph. Scales in mm.

as well as the presence of fully established life cycle.

**Interrelationships of *R. lubricus* from North America and Great Britain.**—The comparison of measurements of various structures of *R. lubricus* from the United States with the data presented by Gabbott & Vachon (1967) and Gardini (1983) for British specimens yielded some interesting observations. North American specimens show some minor differences in a number of linear measurements and linear measurements and morphometric ratios. However, some more important differences have been noted in a number of characters, including the ratio of chelal finger length to the chelal palm length which is

1.33–1.43 (females), 1.31–1.57 (males), and 1.29–1.47 (tritonymph) for UK specimens, as opposed to 1.08–1.29 (females), 1.16–1.345 (males), and 1.19 (tritonymph) for US specimens; and the ratio of pedipalpal tibial length to breadth is 1.83–2.14 for females from the UK, as opposed to 2.14–2.33 for US females. However, the majority of other morphometric characters are close or identical.

Some slight differences between specimens from UK and US are also manifested in the form of pedipalpal articles; in general, the body size and proportions of different structures are somewhat greater in US specimens. The noted small distinctions in setation and other characters



Figures 9–15.—*Roncus lubricus lubricus* L. Koch, 1873, from Cambridge, Mass., USA: 9, microsetae proximal to *eb* and *esb*, male; 10, microsetae proximal to *eb* and *esb*, male; 11, microsetae proximal to *b* and *esb*, tritonymph; 12, pedipalp, female; 13, pedipalp, male; 14, leg IV, male; 15, pedipalp, tritonymph. Scales in mm.

Table 1.—Linear measurements (in mm) and morphometric ratios in *Roncus lubricus lubricus* L. Koch from the US.

Character	Females	Males	Trito.
<b>Body</b>			
Length (1)	1.75–1.94	1.84–2.995	1.97
<b>Cephalothorax</b>			
Length (2)	0.56–0.73	0.62–0.74	0.46
Breadth	0.51–0.63	0.52–0.63	0.445
<b>Abdomen</b>			
Length	1.03–2.29	1.17–2.33	1.51
Breadth	0.69–1.23	0.62–1.03	0.82
<b>Chelicerae</b>			
Length (3)	0.39–0.46	0.38–0.41	0.28
Breadth (4)	0.20–0.24	0.18–0.23	0.16
Length of movable finger (5)	0.26–0.32	0.25–0.29	0.20
Length of galea	0.01	0.01	0.003
<b>Pedipalps</b>			
Length with coxa (6)	3.15–3.66	3.10–3.605	2.17
Ratio 6/1	1.10–2.03	1.08–1.81	1.10
Length of coxa	0.49–0.58	0.47–0.555	0.35
Length of trochanter	0.38–0.46	0.38–0.44	0.27
Length of femur (7)	0.46–0.74	0.63–0.73	0.43
Breadth of femur (8)	0.17–0.22	0.165–0.195	0.14
Ratio 7/8	3.285–4.00	3.46–4.29	3.07
Ratio 7/2	0.945–1.14	0.93–1.11	0.93
Length of tibia (9)	0.50–0.57	0.50–0.59	0.33
Breadth of tibia (10)	0.22–0.255	0.21–0.24	0.16
Ratio 9/10	2.14–2.33	2.22–2.46	2.06
Length of chela (11)	1.11–1.34	1.10–1.30	0.79
Breadth of chela (12)	0.31–0.37	0.30–0.36	0.22
Ratio 11/12	3.35–3.72	3.50–4.07	3.59
Length of chelal palm (13)	0.51–0.61	0.48–0.58	0.36
Ratio 13/12	1.53–1.68	1.60–1.77	1.64
Length of chelal finger (14)	0.59–0.74	0.62–0.74	0.43
Ratio 14/13	1.08–1.29	1.16–1.345	1.19
<b>Leg IV</b>			
Total length	2.18–2.53	2.205–2.495	1.57
Length of coxa	0.32–0.42	0.36–0.425	0.25
Length of trochanter (15)	0.26–0.315	0.27–0.31	0.18
Breadth of trochanter (16)	0.12–0.16	0.12–0.14	0.10
Ratio 15/16	1.93–2.42	2.14–2.38	1.80
Length of femur (17)	0.58–0.67	0.55–0.62	0.41
Breadth of femur (18)	0.20–0.23	0.185–0.23	0.13
Ratio 17/18	2.55–3.12	2.695–3.08	3.15
Length of tibia (19)	0.47–0.60	0.50–0.58	0.34
Breadth of tibia (20)	0.09–0.12	0.10–0.12	0.10
Ratio 19/20	4.58–5.555	4.83–5.40	3.40
Length of basitarsus (21)	0.185–0.21	0.18–0.21	0.14
Breadth of basitarsus (22)	0.07–0.09	0.07–0.08	0.06
Ratio 21/22	2.28–2.86	2.375–2.67	2.33
Length of telotarsus (23)	0.31–0.38	0.32–0.37	0.25
Breadth of telotarsus (24)	0.07–0.085	0.06–0.075	0.065
Ratio 23/24	4.00–5.43	5.14–5.67	3.85
TS ratio—tibia IV	0.56–0.64	0.50–0.62	0.59
TS ratio—basitarsus IV	0.17–0.25	0.17–0.20	0.275
TS ratio—telotarsus IV	0.34–0.41	0.34–0.43	0.39

should be treated as the result of intraspecific variability. One more item should be mentioned here — the trans-Atlantic distribution of *R. lubricus*. The explanation for such a distributional pattern was presented elsewhere by Muchmore (1969). This author suggested that the presence of this species in the United States may be due to its recent introduction by human activity.

***Roncus lubricus pannonicus*, new subspecies  
(Figs. 16–30; Table 2)**

*Roncus aff. lubricus* L. Koch, 1873; Čurčić 1991:165.

**Etymology.**—After Pannonii (sing. *Pannonicus*), a group of Illyrian people, inhabiting Pannonia, the territory in the Save Valley (Divković 1987); the type locality of this subspecies is located in the Pannonian Plain.

**Specimens examined.**—Holotype male, allotype female, 9 paratype males, and 5 paratype females, from the village of Obrež, near Belgrade, Serbia, Yugoslavia, collected from leaf litter and humus in an oak forest, over a period from May 1989 to September 1990 (B. P. M. Čurčić, R. N. Dimitrijević, O. S. Karamata and L. R. Lučić); deposited in the collections of the Institute of Zoology, Faculty of Science, University of Belgrade, Belgrade.

**Description.**—Epistome triangular, apically pointed (Figs. 18, 19, 21). Eyes with flattened lenses. Setal formulae:  $4 + 6 + 2 + 4 + 2 + 6 = 24$ , and  $4 + 6 + 2 + 3 + 2 + 6 = 23$  setae (the latter disposition of setae present in only one specimen of each sex).

Tergite I with 6 or 7 setae, tergite II with 7–11 setae, the subsequent tergites (III–X) each with 8–12 setae. Male genital area: sternite II with a cluster of 14–21 setae; of these, 9–12 longer setae are found along the posterior sternal margin and remainder are smaller and thinning out anteriorly. Sternite III with 4–8 anterior and median setae, 8–12 posterior setae and 3 (rarely 2, 4, or 5) microsetae along each stigma. Sternite IV with 3 (rarely 2 or 4) suprastigmal microsetae on either side and 8–11 posterior setae. Female genital area: sternite II with 7–14 small setae arranged in form of two barely distinguishable groups; sternite III with a transverse row of 10–14 setae and 3 suprastigmal microsetae on each side. Sternite IV with a row of 8–10 posterior setae and 3 microsetae along each stigma. Sternites V–X each with 12–16 setae. Setae on sternites VII–X arranged in transverse rows, with no anterior and median setae present.

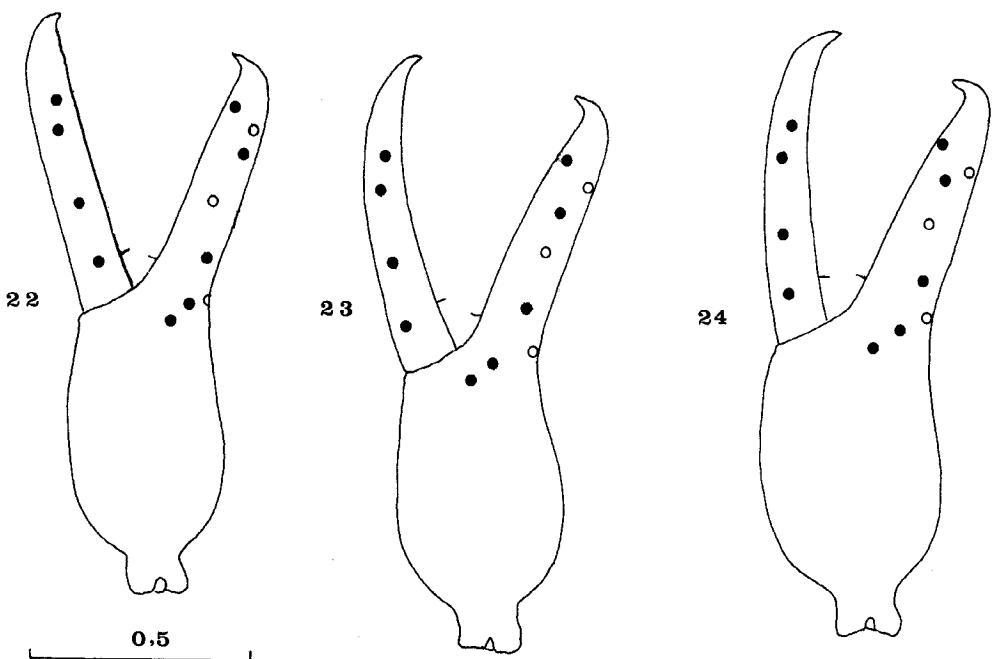
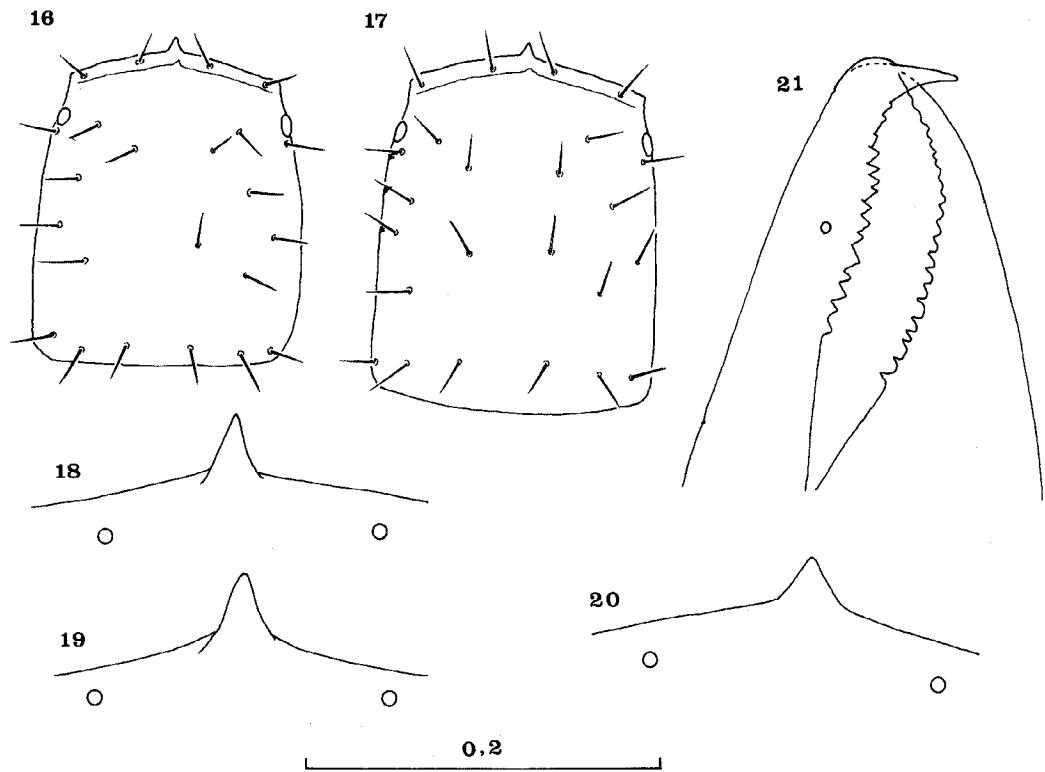
The cheliceral spinneret (galea) as a low hya-

line convexity, slightly more prominent in females than in males. Cheliceral palm with 6 (in both sexes), and the movable finger with only 1 seta. Fixed cheliceral finger with 18–23 small teeth; movable cheliceral finger with 12–17 teeth (Fig. 21). Flagellum with 1 short proximal blade and 7 longer blades distally, all blades denticulate. Apex of pedipalpal coxa with 4 long setae. Pedipalpal trochanter with 2 small lateral tubercles and some inconspicuous denticulations dorsally, pedipalpal femur with a small lateral tubercle and distinct granulations as in Figs. 29, 30. Tibia with some rare and inconspicuous elevations interiorly and laterally, or smooth. Chelal palm with distinct granulations interolaterally and small and almost flattened elevations on its extero-lateral side. A patch of 1–4 microsetae present proximal to *eb* and *esb*; also, 1–6 additional microsetae developed lateral and distal to *eb* and *esb*. A tiny tubercle present on laterodistal side of chelal palm. Fixed chelal finger with 55–63 (male), and 52–63 teeth (female); distal teeth of this finger are pointed and asymmetrical, followed by small, close-set, and retroconical teeth. Movable chelal finger with 57–63 (male) or 51–64 teeth (female); only distal teeth pointed and retroconical, these gradually give way to rounded or square-cusped teeth which stretch as far as the level of *b*. Sensillum distal to *sb*, between 17th and 24th tooth (male), or between 15th and 22nd tooth (female). Chelal fingers longer than chelal palm and slightly shorter than pedipalpal femur. Pedipalpal femur slightly shorter than carapace (Table 2).

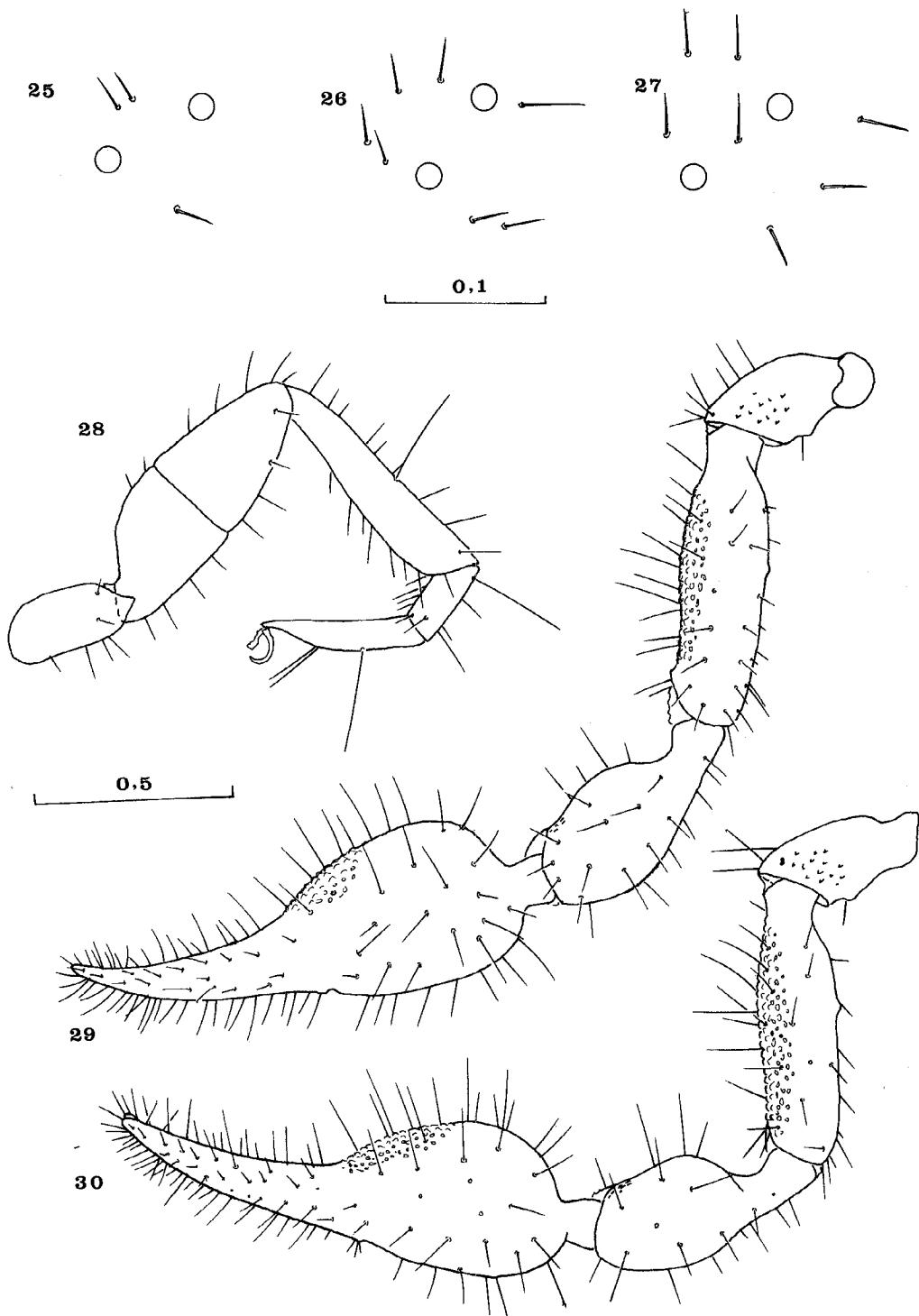
Trichobothriotaxy: *ist* slightly closer to *est* than to *ish*, *sb* slightly closer to *b* than to *st* (Figs. 22–24). Tibia IV, basitarsus IV, and telotarsus IV each with a single tactile seta (Fig. 28). Tactile seta ratios, morphometric ratios and linear measurements are presented in Table 2.

**Distribution.**—Yugoslavia (Pannonian Plain), epigean (in humus and leaf litter).

**Interrelationships of *R. lubricus pannonicus* and the nominal subspecies.**—As far as the morphometric ratios and linear measurements are concerned, the new subspecies can be easily distinguished from the nominal subspecies (inhabiting western Europe and North America). In spite of the fact that the majority of these characters are either very close in both subspecies, or their values overlap, there exist a number of features which are distinct in both subspecies. For instance, the carapacial length in *R. lubricus lubricus* (the val-



Figures 16-24.—*Roncus lubricus pannonicus* n. ssp., from Obrež, near Belgrade, Yugoslavia: 16, carapace, male; 17, carapace, female; 18, epistome, male; 19, epistome, male; 20, epistome, female; 21, cheliceral fingers, female; 22, pedipalpal chela, male; 23, pedipalpal chela, male; 24, pedipalpal chela, female. Scales in mm.



Figures 25–30.—*Roncus lubricus pannonicus* n. ssp., from Obrež, near Belgrade, Yugoslavia: 25, microsetae proximal to *b* and *esb*, male; 26, microsetae proximal to *eb* and *esb*, male; 27, microsetae proximal to *eb* and *esb*, female; 28, leg IV, male; 29, pedipalp, female; 30, pedipalp, male. Scales in mm.

Table 2.—Linear measurements (in mm) and morphometric ratios in *Roncus lubricus pannonicus* new subspecies from Yugoslavia.

Character	Females	Males
<b>Body</b>		
Length (1)	2.73–3.66	2.48–3.06
<b>Cephalothorax</b>		
Length (2)	0.72–0.88	0.72–0.81
Breadth	0.60–0.69	0.58–0.63
<b>Abdomen</b>		
Length	1.99–2.78	1.85–2.40
Breadth	0.75–1.10	0.82–1.17
<b>Chelicerae</b>		
Length (3)	0.445–0.50	0.42–0.46
Breadth (4)	0.23–0.25	0.205–0.23
Length of movable finger (5)	0.315–0.36	0.29–0.315
Length of galea	0.01	0.01
<b>Pedipalps</b>		
Length with coxa (6)	3.65–4.015	3.51–3.89
Ratio 6/1	1.10–1.40	1.15–1.455
Length of coxa	0.58–0.63	0.50–0.60
Length of trochanter	0.425–0.47	0.42–0.47
Length of femur (7)	0.72–0.80	0.69–0.795
Breadth of femur (8)	0.21–0.24	0.21–0.23
Ratio 7/8	3.13–3.52	3.26–3.785
Ratio 7/2	0.91–1.04	0.925–1.09
Length of tibia (9)	0.60–0.675	0.59–0.66
Breadth of tibia (10)	0.25–0.30	0.27–0.29
Ratio 9/10	2.10–2.44	2.185–2.37
Length of chela (11)	1.28–1.44	1.26–1.41
Breadth of chela (12)	0.38–0.45	0.37–0.41
Ratio 11/12	2.93–3.37	3.191–3.51
Length of chelal palm (13)	0.59–0.69	0.57–0.665
Ratio 13/12	1.38–1.55	1.46–1.62
Length of chelal finger (14)	0.69–0.75	0.68–0.745
Ratio 14/13	1.09–1.17	1.12–1.28
<b>Leg IV</b>		
Total length	2.67–2.84	2.56–2.775
Length of coxa	0.43–0.48	0.40–0.49
Length of trochanter (15)	0.32–0.36	0.29–0.34
Breadth of trochanter (16)	0.15–0.18	0.15–0.17
Ratio 15/16	1.89–2.19	1.88–2.27
Length of femur (17)	0.69–0.74	0.66–0.72
Breadth of femur (18)	0.25–0.26	0.22–0.26
Ratio 17/18	2.73–2.92	2.64–3.045
Length of tibia (19)	0.62–0.64	0.59–0.68
Breadth of tibia (20)	0.12–0.14	0.12–0.14
Ratio 19/20	4.57–5.17	4.615–5.58
Length of basitarsus (21)	0.22–0.23	0.21–0.25
Breadth of basitarsus (22)	0.09–0.10	0.08–0.09
Ratio 21/22	2.20–2.555	2.33–2.875
Length of telotarsus (23)	0.38–0.40	0.34–0.38
Breadth of telotarsus (24)	0.08	0.075–0.08
Ratio 23/24	4.75–5.00	4.25–4.93
TS ratio—tibia IV	0.505–0.60	0.51–0.63
TS ratio—basitarsus IV	0.15–0.21	0.18–0.205
TS ratio—telotarsus IV	0.37–0.40	0.35–0.48

ues for *R. lubricus pannonicus* n. ssp. are enclosed in parentheses) is 0.56–0.73 mm for females, and 0.56–0.74 mm for males (0.72–0.88 mm and 0.72–0.81 mm); the cheliceral length is 0.37–0.46 mm for females and 0.34–0.41 mm for males (0.445–0.50 mm and 0.42–0.47 mm); the pedipalpal tibia length is 0.45–0.57 mm in females and 0.50–0.59 mm in males (0.60–0.675 mm and 0.59–0.66 mm); the chelal palm breadth is 0.27–0.37 mm in females and 0.27–0.36 mm in males (0.38–0.45 mm and 0.37–0.41 mm), etc. In general, the appendages and other body structures in *R. lubricus pannonicus* n. ssp. are larger than in the nominal subspecies.

Apart from these morphometric distinctions, there exist some qualitative differences between the two subspecies, such as those manifested in the disposition of some trichobothria on both fixed and movable chelal fingers. For example, in *R. lubricus lubricus*, the trichobothrium *ist* is equidistant from *est* and *ish*, while in *R. lubricus pannonicus* n. ssp. it is slightly closer to *est* than to *ish*. Furthermore, *sb* is equidistant from *st* and *b* in the nominal subspecies, while in *R. lubricus pannonicus* n. ssp. it is closer to *b* than to *st*.

Interestingly enough, it is obvious that *R. lubricus pannonicus* n. ssp. belongs to the Balkan endemic and relict fauna. The presence of this form, as well as of some other non-cavernicolous endemics (Čurčić, in press), supports the fact that the endemic differentiation in the Balkans has been taking place not only in subterranean (Čurčić 1988) but also in epigean habitats.

#### KEY TO THE SUBSPECIES OF *RONCUS LUBRICUS*

1. Trichobothrium *ist* equidistant from *est* and *ish*, and *sb* equidistant from *st* and *b*. Pedipalpal tibial length 0.45–0.57 mm (females) and 0.50–0.59 mm (males). Western Europe and North America ..... *R. lubricus lubricus*  
Trichobothrium *ist* closer to *est* than to *ish*, and *sb* closer to *b* than to *st*. Pedipalpal tibial length 0.60–0.675 mm (females) and 0.59–0.66 mm (males). Southeastern Europe .....  
..... *R. lubricus pannonicus*, n. ssp.

*Roncus tenuis* Hadži, new status  
(Figs. 31–41; Table 3)

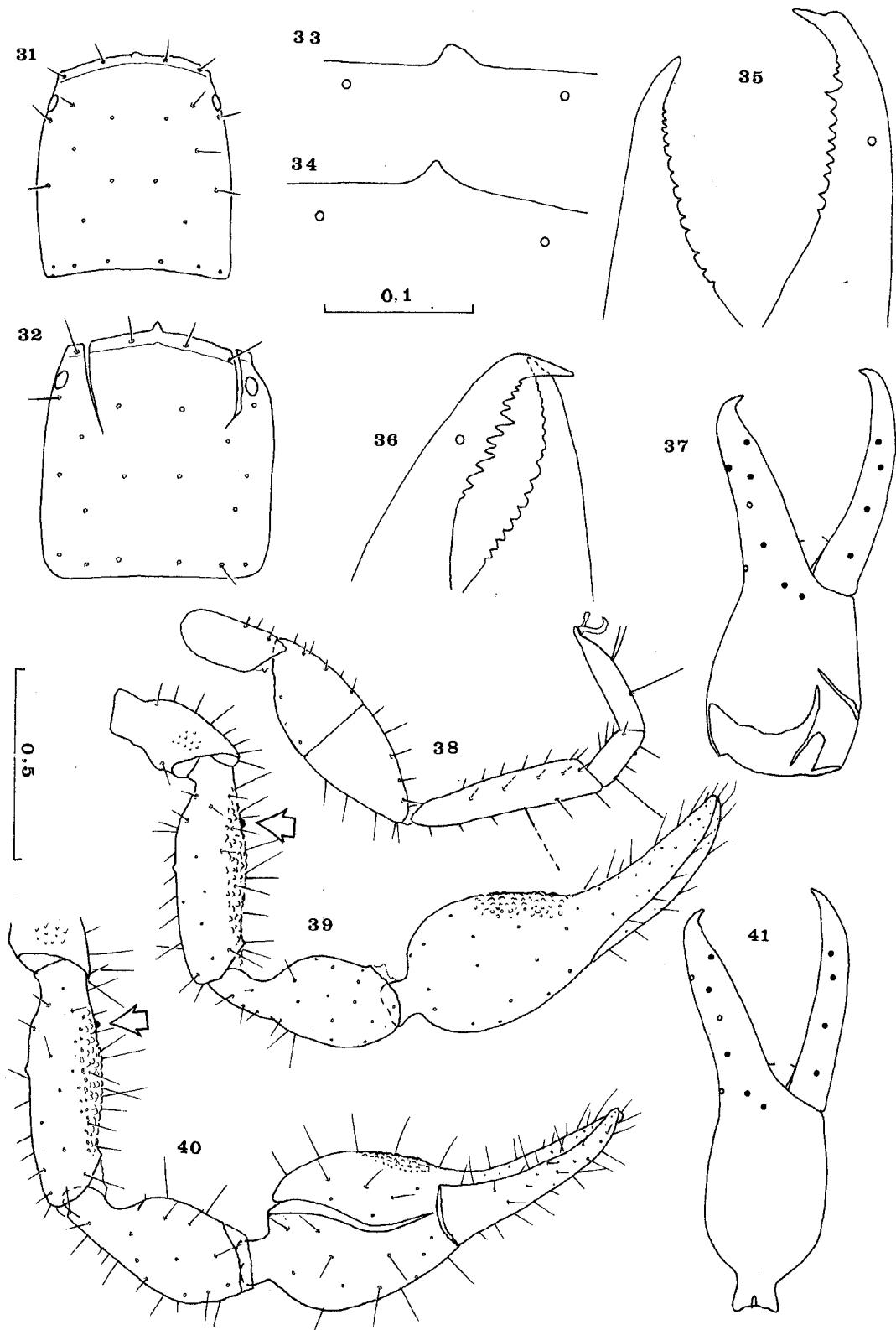
*Roncus (Roncus) lubricus tenuis* Hadži, 1933:166–170.

**Specimens examined.**—The type series consists of two specimens (one of each sex); neither of these was designated as the holotype by Hadži (1933). Therefore, we hereby designate the syntype male as the lectotype

and the syntype female as a paralectotype. The lectotype is mounted on a slide with the label “*Roncus*, ♂ Malinska, 1929”. The paralectotype is mounted on a separate slide and labelled “*Roncus (Roncus)*, ♀ 17.IV 1927, under stone, Malinska”. This locality is situated on the Island of Krk, in the northern Adriatic region (Dalmatia), Yugoslavia.

**Description.**—Epistome tubercular (Fig. 33) or triangular (Fig. 34). Eyes with almost flattened lenses (Figs. 31, 32). Setal formulae:  $4 + 6 + 2 + 4 + 2 + 6 = 24$  and  $4 + 6 + 4 + 2 + 6 = 22$ . Tergites I–X bearing 6–10–11–11–10–10–10–10–9 and 6–8–10–10–11–12–10–11–11–9 setae. Male genital area: sternite II with 18 median and posterior setae; of these, 10 setae along posterior sternal margin and the remainder (8 setae) medial, thinning out anteriorly. Sternite III with 3 or 4 microsetae on each side, 3 anterior and median setae, and a transverse row of 10 setae. Female genital area: sternite II with 7 small median and posterior setae of irregular distribution. Sternite III with 9 posterior setae and 3 microsetae along each stigma. Cheliceral spinneret low and flattened, but somewhat more prominent in female than in male (Figs. 35, 36). Fixed cheliceral finger with 15–18 small teeth. Movable cheliceral finger with 11 or 12 teeth. Fixed cheliceral finger with 6, movable finger with 1 seta. Flagellum with 1 short proximal blade and 7 or 8 longer blades distally. Apex of pedipalpal coxa of the lectotype with 4 long setae (the paralectotype has 3 setae on the right, and 4 on the left apex). Pedipalpal trochanter with a small tubercle and some inconspicuous denticulations dorsally (Figs. 39, 40). Pedipalpal femur with an extero-lateral tubercle and an intero-basal tubercle; surface with granulations on its intero-lateral side. Tibia tulip-shaped and smooth. Chelal palm with interior and lateral granulations (Figs. 39, 40). Fixed chelal finger with 52–54 teeth, and movable finger with 55–56 teeth. Only distal teeth on the latter finger retroconical and pointed; these gradually merging into rounded or square-cusped teeth which reach the level of *b*. The patch of microsetae proximal to *eb* and *esb* absent; a single tubercle on laterodistal side of chelal palm evident. Sensillum at the level of 13th (male) or 18th tooth (female), either proximal (male) or distal to *sb* (female).

Chelal palm ovate (dorsal view). Chelal fingers only slightly longer than (male) or equal to chelal palm (female), but shorter than pedipalpal femur (Table 3). Pedipalpal femur length almost equal to carapacial length (Table 3). Disposition of tri-



Figures 31–41.—*Roncus tenuis* Hadži, new status, from Malinska, Yugoslavia: 31, carapace, male; 32, carapace, female; 33, epistome, male; 34, epistome, female; 35, chelicaler fingers, female; 36, chelicaler fingers, male; 37, pedipalpal chela, female; 38, leg IV, female; 39, pedipalp, male; 40, pedipalp, female; 41, pedipalpal chela, male. Scales in mm.

chobothria: *ist* slightly closer to *est* than to *isb* (or equidistant from these); seta *sb* equidistant from *b* and *st*. The trichobothrial pattern as in Figs. 37, 41. Trochanteral foramen pointed and heavily sclerotized. Tibia IV, basitarsus IV, and telotarsus IV each with a single tactile seta (Fig. 38). Tactile seta ratios are presented in Table 3.

Morphometric ratios and linear measurements are presented in Table 3.

**Distribution.**—This species seems to be restricted to the northern Adriatic region in Yugoslavia. To date, it is known from its type locality only (Malinska, Island of Krk).

**Interrelationships of *R. tenuis* and *R. lubricus*.**—There is no doubt that *R. tenuis* should be given full specific rank. The differences between *R. tenuis* and *R. lubricus* are clearly manifested in many morphometric ratios and linear measurements (see Tables 1, 3). Furthermore, the two species differ in the presence/absence of a patch of microsetae proximal to *eb* and *esb* (present in *lubricus*, absent in *tenuis*), in the form of the pedipalpal articles (attenuated in *lubricus*, stout in *tenuis*), in the presence/absence of an intero-basal tubercle on pedipalpal femur (present in *tenuis*, absent in *lubricus*), in the form of the epistome (small and tubercular in *tenuis*, long and triangular in *lubricus*), in the ratio of chelal finger length to chelal palm length (lower in *tenuis*, higher in *lubricus*), and in body size (smaller in *tenuis*, greater in *lubricus*).

A thorough analysis of the external morphology and biogeography of both taxa suggests that *R. tenuis* does not belong to the *R. lubricus* group of species (whose members have microsetae proximal to *eb* and *esb*). It seems that this species belongs to another species group, whose origin is derived from the eastern Mediterranean or Balkanic pseudoscorpion fauna.

#### *Roncus dalmatinus* Hadži, new status

(Figs. 42–50; Table 3)

*Roncus* (*Roncus*) *lubricus dalmatinus* Hadži, 1933:170–175.

**Specimens examined.**—According to Hadži (1933), the type series of this taxon consisted of “specimens” collected in Omišalj on the Island of Krk, and in Split (Meje), both in Yugoslavia. We have studied two males from the type series, both from Split, Mt. Marjan (Meje). These specimens are the only available syntypes. They are both mounted on a slide labelled “*Obisium* (*Roncus*) *lubricus*, Split-Marjan, in the vicinity of the pension “Split”, Meje, 28.III–14.IV 1927”. The other type

specimens, if any, seem to be lost or damaged. Therefore, we hereby designate the male specimen labelled “1” as the lectotype and the male labelled “2” as the paralectotype of this taxon.

**Description.**—Epistome triangular and pointed (Figs. 47, 48). Eyes small and with almost flattened lenses (Figs. 42, 43). Setal formulae:  $4 + 6 + 2 + 4 + 2 + 7 = 25$  and  $4 + 6 + 2 + 4 + 2 + 8 = 26$ .

Tergite I with 6–10 setae, the following tergites (III–X) each with 10–13 setae (mostly 11). Male genital area: sternite II with 15–17 median and posterior setae; of these, 10 longer setae along posterior sternal margin and the remainder medial and posteriorad, thinning out anteriorly. Sternite III with 3 small setae along each stigma, 3–5 anterior and median setae and 9 or 10 posterior setae. Sternite IV with 10 posterior setae and 3 small setae along each stigmatic plate. Female genital area: unknown. However, according to Hadži (1933), sternite II of the female with 13 small median and posterior setae, and sternite III with 3 suprastigmatic setae on each side and a posterior row of 14 setae; sternite IV with a row of 9 setae and 3 small setae along each stigma. Unfortunately, this female specimen was not available, due to its probable loss or destruction. In males, sternites IV–X each with 12–15 setae (mostly 13).

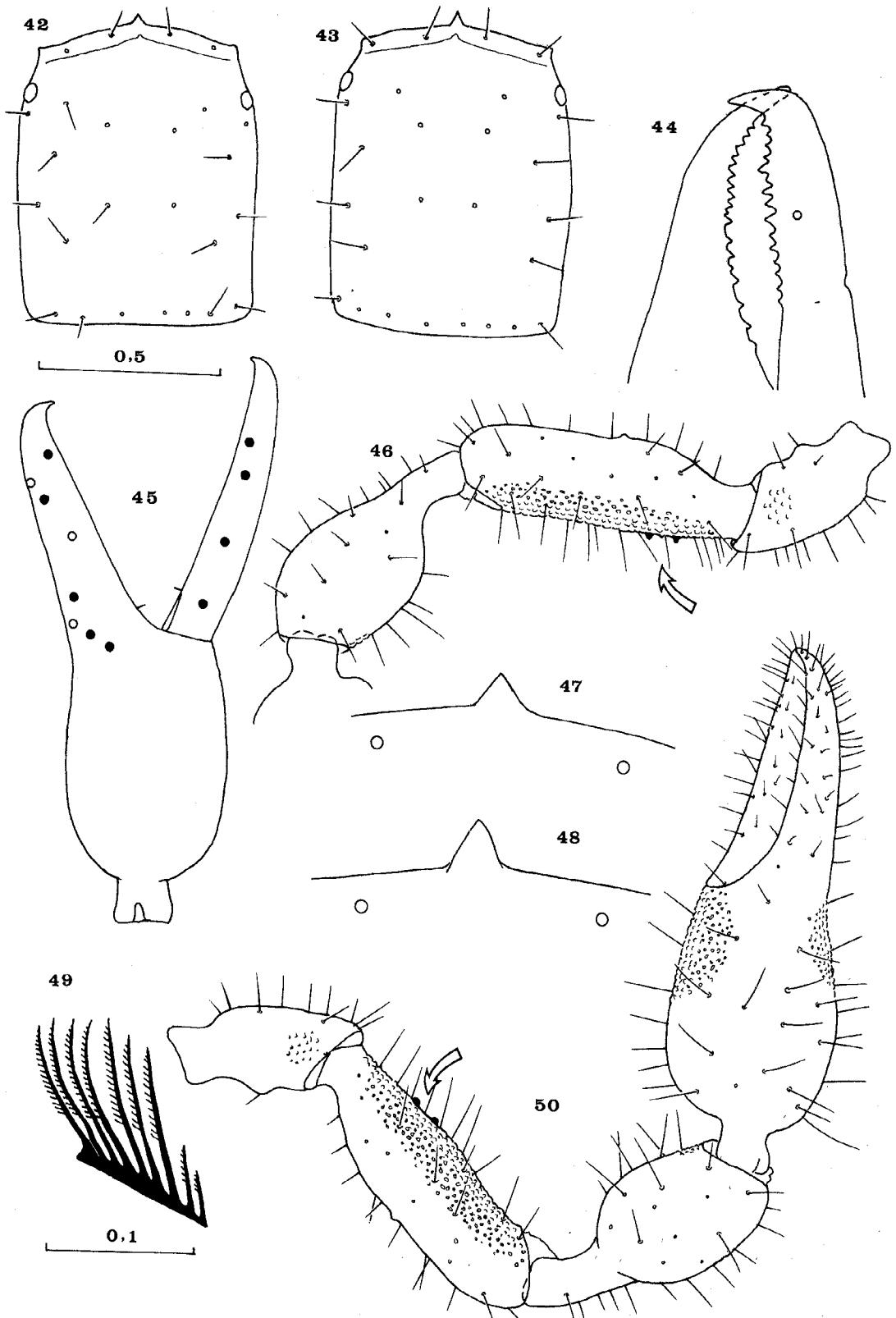
Cheliceral spinneret (galea) low and flattened (Fig. 44). Fixed cheliceral finger with 18, and movable finger with 15 small teeth. Flagellum of 8 or 9 blades, with 1 or 2 short proximal blades and 7 longer blades distally (Fig. 49).

Apex of pedipalpal coxa (manducatory process) with 4 long setae. Pedipalpal trochanter with a small tubercle and inconspicuous denticulations dorsally (Figs. 46, 50). Pedipalpal femur with an extero-lateral tubercle and a pair of interior and basal prominent tubercles; surface of this podomere granulated interiorly and dorsally (Figs. 46, 50). Pedipalpal tibia elongated and tulip-shaped, with few inconspicuous granulations interiorly and distally. Chelal palm ovate (dorsal view), with some interior and exterior granulations laterally (Figs. 46, 50). Fixed chelal finger with 66–68 small teeth, and movable chelal finger with 60–62 teeth. Only distal teeth of the latter finger retroconical and pointed, gradually merging into rounded or square-topped teeth which reach the level of *b*. Sensillum at level of 20th to 26th tooth (at the level of *sb* or slightly distal to this trichobothrium).

A patch of microsetae proximal to *eb* and *esb*

Table 3.—Linear measurements (in mm) and morphometric ratios in *Roncus lubricus tenuis* Hadži, new status, and *Roncus dalmatinus* Hadži, new status, from Yugoslavia.

Character	<i>R. tenuis</i>		<i>R. dalmatinus</i>
	Male	Females	Males
Body			
Length (1)	2.19	2.49	2.86–2.91
Cephalothorax			
Length (2)	0.61	0.67	0.85–0.87
Breadth	0.54	0.63	0.65–0.665
Abdomen			
Length	1.58	1.82	1.99–2.06
Breadth	0.62	0.75	0.99–1.03
Chelicerae			
Length (3)	0.37	0.41	0.47–0.48
Breadth (4)	0.195	0.21	0.23–0.24
Length of movable finger (5)	0.25	0.29	0.31–0.32
Length of galea	0.005	0.01	0.01
Pedipalps			
Length with coxa (6)	3.21	3.28	4.31–4.375
Ratio 6/1	1.465	1.32	1.50–1.51
Length of coxa	0.50	0.51	0.65–0.73
Length of trochanter	0.39	0.39	0.51–0.555
Length of femur (7)	0.63	0.67	0.85–0.88
Breadth of femur (8)	0.195	0.21	0.255–0.26
Ratio 7/8	3.23	3.19	3.27–3.45
Ratio 7/2	1.03	1.00	0.98–1.035
Length of tibia (9)	0.54	0.55	0.74–0.75
Breadth of tibia (10)	0.24	0.25	0.34
Ratio 9/10	2.25	2.20	2.18–2.205
Length of chela (11)	1.15	1.16	1.48–1.54
Breadth of chela (12)	0.35	0.38	0.47–0.50
Ratio 11/12	3.285	3.05	2.96–3.28
Length of chelal palm (13)	0.57	0.58	0.74–0.78
Ratio 13/12	1.63	1.53	1.48–1.66
Length of chelal finger (14)	0.58	0.58	0.74–0.76
Ratio 14/13	1.02	1.00	0.97–1.00
Leg IV			
Total length	2.355	2.385	2.67
Length of coxa	0.38	0.39	0.45
Length of trochanter (15)	0.31	0.32	0.34
Breadth of trochanter (16)	0.15	0.15	0.15
Ratio 15/16	2.07	2.13	2.27
Length of femur (17)	0.59	0.61	0.69
Breadth of femur (18)	0.22	0.22	0.25
Ratio 17/18	2.68	2.77	2.76
Length of tibia (19)	0.55	0.545	0.63
Breadth of tibia (20)	0.11	0.11	0.14
Ratio 19/20	5.00	4.95	4.50
Length of basitarsus (21)	0.195	0.20	0.23
Breadth of basitarsus (22)	0.10	0.08	0.10
Ratio 21/22	1.95	2.50	2.30
Length of telotarsus (23)	0.33	0.32	0.33
Breadth of telotarsus (24)	0.07	0.08	0.08
Ratio 23/24	4.71	4.00	4.125
TS ratio—tibia IV	0.60	0.58	0.58
TS ratio—basitarsus IV	0.21	0.21	0.19
TS ratio—telotarsus IV	0.33	0.30	0.35



Figures 42–50.—*Roncus dalmatinus* Hadži, new status, from Mt. Marjan (Meje), Split, Yugoslavia: 42, carapace, male; 43, carapace, male; 44, cheliceral fingers, male; 45, pedipalpal chela, male; 46, pedipalpal trochanter, femur and tibia, male; 47, epistome, male; 48, epistome, male; 49, flagellum, male; 50, pedipalp, male. Scales in mm.

absent; a single tubercle on laterodistal side of chelal palm evident. Chelal fingers as long as the chelal palm (Table 3), but shorter than pedipalpal femur. Pedipalpal femur length almost equal to carapacial length (Table 3).

Disposition of trichobothria: *ist* slightly closer to *est* than to *isb*; seta *sb* only slightly closer to *b* than to *st* (or equidistant from these) (Fig. 45). Trochanteral foramen pointed and heavily sclerotized. Tibia IV, basitarsus IV, and telotarsus IV each with a single tactile seta; tactile seta ratios as in Table 3. Morphometric ratios and linear measurements are presented in Table 3.

**Distribution.**—According to Hadži (1933), this species is present on the Island of Krk and at Mt. Marjan, near Split (Dalmatia), Yugoslavia. However, the available type material at our disposal comes from the vicinity of Split only. Therefore, this species is now known from Middle Dalmatia only, although it may be widespread on some Adriatic islands.

**Interrelationships of *R. dalmatinus*, *R. lubricus*, and *R. tenuis*.**—From *R. lubricus*, *R. dalmatinus* is easily distinguished by the form of the carapace (see also Tables 1, 3), by the setation of the posterior carapacial margin (6 setae in *lubricus*, 7–8 in *dalmatinus*), by the form of pedipalpal articles (more stout in *dalmatinus*, more slender in *lubricus*), by the presence/absence of two sclerotic knobs at the interior and basal region of the pedipalpal femur (present in *dalmatinus*, absent in *lubricus*), by the presence/absence of microsetae proximal to *eb* and *esb* (present in *lubricus*, absent in *dalmatinus*), as well as by some morphometric ratios and linear measurements (Tables 1, 3).

The distinctions between *R. dalmatinus* and *R. tenuis* are clearly manifested in the form and size of the epistome (small and tubercular in *tenuis*, large and triangular in *dalmatinus*), in the proportions of the carapace (only slightly longer than wide in *tenuis*, considerably longer than wide in *dalmatinus*), in the setation of the posterior carapacial row (6 setae in *tenuis*, 7–8 in *dalmatinus*), in the form of the pedipalpal articles (more stout in *tenuis*, more slender in *dalmatinus*), in the number of sclerotic knobs on the interobasal part of the pedipalpal femur (one in *tenuis*, two in *dalmatinus*), as well as in some morphometric ratios and linear measurements. According to the absence of microsetae proximal to *eb* and *esb*, as well as to the presence of sclerotic knobs on the interior and lateral surface of pedipalpal femora,

it can be assumed that both *R. tenuis* and *R. dalmatinus* pertain to the same species group, which is clearly distinct from *R. lubricus* and its allies.

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